# BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

## IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.**

## AMENDMENTS TO THE CLAIMS

IN THE CLAIMS:

Claims 1-34 (previously cancelled).

35. (currently amended) A process for forming a polymer having at least one functionalized end group, the process comprising the steps of:

(a) heating a mixture of an activated iodine reagent, a free-radical initiator, and at least one polymerizable monomer to form a pre-polymer, the activated iodine reagent being of the formula:

R-I

where R contains at least one radical stabilizing group and has 1-50 carbon atoms, the iodine and the radical stabilizing group are attached to the same carbon atom in R, and the radical stabilizing group is selected from the group consisting of an aryl, ester, amide, ketone, nitrile, halogen, and nitro; and

(b) functionalizing the pre-polymer by reaction with a nucleophilic reagent selected from mercaptoethanol, thioglycolic acid, mercaptopropanol, thiopropionic acid, allyl mercaptan, and mercaptoethylamine.

36. (previously canceled).

37. The process of claim 35 wherein the activated iodine reagent is one selected from the group consisting of iodoacetonitrile, ethyl 1-iodopropionate, 4-methylbenzyliodide and 1-iodo-ethylbenzene.

38. The process of claim 35 wherein the free-radical initiator is one selected from the group consisting of hydrogen peroxide, *t*-butyl hydroperoxide, *t*-butyl perbenzoate, *t*-amyl

perbenzoate, *t*-butyl peroctoate, *t*-amyl peroctoate, ditertiary butyl peroxide, tertiary-amyl hydroperoxide, dibenzoyl peroxide, potassium persulfate and methyl ethyl ketone peroxide.

39. The process of claim 35 wherein the free-radical initiator is one selected from the group consisting of azobisisobutyronitrile, azobiscyanovaleric acid, azobis (hydroxethylcyanovaleramide), azobis (cyclohexanecarbonitrile), 2.2' azobis (4-methoxy-2,4-dimethylvaleronitrile), 2.2'-azobis[2-methyl-N-(2-hydroxyethyl)propionamide].

40. The process of claim 35 wherein the monomer is one selected from the group consisting of styrene and substituted derivatives thereof, conjugated dienes and substituted derivatives thereof, acrylates and substituted derivatives thereof, acrylonitrile, acrylic acid and mixtures thereof.

41. (cancelled).

42. The process of claim 35 wherein the heating is conducted in a solvent or in bulk.

43. (currently amended) The process of claim ~~41~~ 42 wherein the solvent is one selected from the group consisting of toluene, amyl acetate, butyl acetate, pseudocumene, tetrahydrofuran, and dimethylformamide.

44. (currently amended) The process of claim ~~42~~ 43 wherein the solvent is toluene.

45. The process of claim 35 wherein the iodine reagent is preformed or formed *in situ*.

46. The process of claim 35 wherein the polymerizable monomer is added to the mixture simultaneously, sequentially, batchwise or metered.

47. (previously amended) A process for forming a polymer having at least one functionalized end group, the process comprising the steps of:

(a) heating a mixture of an activated di-iodine reagent, a free-radical initiator, and at least one polymerizable monomer to form a pre-polymer, the activated di-iodine reagent being of the formula:

I-R-I

where R contains at least one radical stabilizing group and has 1-50 carbon atoms, the iodine and the radical stabilizing group are attached to the same carbon atom in R, and the radical stabilizing group is selected from the group consisting of an aryl, alkene, ester, acid, amide, ketone, nitrile, halogen, isocyanate, nitro and amine; and

(b) functionalizing the pre-polymer by reaction with a nucleophilic reagent.

48. (previously cancelled).

49. The process of claim 47 wherein the activated di-iodine reagent is α,α′-diiodoxylene or methyl 2,5-diiodohexanedioate.

50. The process of claim 47 wherein the free-radical initiator is one selected from the group consisting of peroxo compounds containing at least one O-O group.

51. The process of claim 47 wherein the free-radical initiator is one selected from the group consisting of azobisisobutyronitrile, azobiscyanovaleric acid, azobis (hydroxethylcyanovaleramide), azobiscyanovaleric acid, azobis (hydroxethylcyanovaleramide), azobis (cyclohexanecarbonitrile), 2.2' azobis (4-methoxy-2,4-dimethylvaleronitrile), 2.2'-azobis[2-methyl-N-(2-hydroxyethyl)propionamide].

52. (previously amended) The process of claim 47 wherein the monomer is one selected from the group consisting of styrene and substituted derivatives thereof, conjugated

dienes and substituted derivatives thereof, acrylates and substituted derivatives thereof, acrylonitrile, acrylic acid and mixtures thereof.

53. (currently amended) The process of claim ~~48~~ 47 wherein the nucleophilic reagent is one selected from the group consisting of mercaptoethanol, thioglycolic acid, mercaptopropanol, thiopropionic acid, allyl mercaptan, and mercaptoethylamine.

54. The process of claim 47 wherein the heating is conducted in a solvent or in bulk.

55. The process of claim 54 wherein the solvent is one selected from the group consisting of toluene, amyl acetate, butyl acetate, pseudocumene, tetrahydrofuran, and dimethylformamide.

56. The process of claim 54 wherein the solvent is toluene.

57. The process of claim 47 wherein the iodine reagent is preformed or formed *in situ*.

58. The process of claim 47 wherein the polymerizable monomer is added to the mixture simultaneously, sequentially, batchwise or metered.

59. (previously cancelled).

Claims 60-68 (previously cancelled).

69. (currently amended) A process for forming a polymer having at least one functionalized end group, the process comprising the steps of:

(a) heating a mixture of an iodine reagent having at least one iodine end group, a free-radical initiator, and at least one polymerizable monomer, the molar ratio of the

free-radical initiator to the iodine reagent being 10 to 0.001, the molar ratio of the monomer to the iodine reagent being 10 to 1000; and

(b) converting the iodine end group to the functionalized end group by reaction with a nucleophilic reagent wherein said iodine regent is selected from a compound of the formulae:

$Z_2$-R-I or I-R-I

where R contains at least one radical stabilizing group and has 1-50 carbon atoms, the iodine and the radical stabilizing group are attached to the same carbon atom in R, and the radical stabilizing group is selected from the group consisting of an aryl, alkene, ester, acid, amide, ketone, nitrile, halogen, isocyanate, nitro and amine, and $Z_2$ is selected from $-OR_1$, $-N(R_1)_2$, $-SR_1$, $-COOR_1$, -COOM, olefin of the type $-CR_1=C(R_1)_2$, epoxide of the type

$-CR_1-C(R_1)_2$,

$-SO_3M$, $-PO(OR_1)_2$, $-PO(R_1)_3$, $-P(R_1)_3$, -N=C=O and $-CR_1=O$, wherein $R_1$ is equal to H or a group having 1-20 carbon atoms, $R_1$ being the same or different for any $Z_2$ having more than one $R_1$, and wherein M is a metal ion.

70. The process of claim 69 wherein the monomer is selected from the group consisting of $C_3$-$C_6$ monoethylenically unsaturated carboxylic acids, and the alkaline metal and ammonium salts thereof. The $C_3$-$C_6$ monoethylenically unsaturated carboxylic acids include acrylic acid, methacrylic acid, crotonic acid, vinyl acetic acid, maleic acid, fumaric acid and itaconic acid.

Claims 71-74 (cancelled).

75. (currently amended) The process of claim ~~74~~ 69 wherein the activated di-iodine reagent is α,α′-diiodoxylene or methyl 2,5-diiodohexanedioate.

76. The process of claim 69 wherein the free-radical initiator is one selected from the group consisting of hydrogen peroxide, *t*-butyl hydroperoxide, *t*-butyl perbenzoate, *t*-amyl perbenzoate, *t*-butyl peroctoate, *t*-amyl peroctoate, ditertiary butyl peroxide, tertiary-amyl hydroperoxide, dibenzoyl peroxide, potassium per sulfate and methyl ethyl ketone peroxide.

77. The process of claim 69 wherein the free-radical initiator is one selected from the group consisting of azobisisobutyronitrile, azobiscyanovaleric acid, azobis (hydroxethylcyanovaleramide), azobis (cyclohexanecarbonitrile), 2.2' azobis (4-methoxy-2,4-dimethylvaleronitrile), 2.2'-azobis[2-methyl-N-(2-hydroxyethyl)propionamide].

78. The process of claim 69 wherein the monomer is one selected from the group consisting of styrene and substituted derivatives thereof, conjugated dienes and substituted derivatives thereof, acrylates and substituted derivatives thereof, and mixtures thereof.

79. The process of claim 69 wherein the nucleophilic reagent is one selected from the group consisting of mercaptoethanol, thioglycolic acid, mercaptopropanol, thiopropionic acid, allyl mercaptan, and mercaptoethylamine.

80. The process of claim 69 wherein the heating is conducted in a solvent or in bulk.

81. The process of claim 80 wherein the solvent is one selected from the group consisting of toluene, amyl acetate, butyl acetate, pseudocumene and tetrahydrofuran.

82. The process of claim 80 wherein the solvent is toluene.

83. The process of claim 69 wherein the iodine reagent is preformed or formed *in situ*.

84. The process of claim 69 wherein the polymerizable monomer is added to the mixture simultaneously, sequentially, batchwise or metered.

Claims 85-108 (previously canceled).

109. (previously added) The process of claim 35, 47, or 69 wherein said mixture in step (a) contains a base selected from ZnO, pyridine, 4-dimethylaminopyridine, diazabicyclo[5,4,0] undec-7-ene, $K_2CO_3$, $K_3PO_4$, $NaHCO_3$, basic alumina, triethylamine, and CaO, and 1,4-diazabicyclo[2,2,2]octane.

110. (previously added) The process of claim 35, 47, or 69 wherein said nucleophilic reagent is selected from a compound represented by the formula:

$$Z_1\text{-}R_2\text{-}YH$$

where Y is selected from the group consisting of oxygen, sulfur, and $NR_5$, where $R_5$ is hydrogen or a substituted or unsubstituted alkyl group or is not present when Z is directly bonded to the polymer, and

where $Z_1$ is selected from the group consisting of $-OR_1$, $-N(R_1)_2$, $-SR_1$, $-COOR_1$, -COOM, olefin of the type $-CR_1=C(R_1)_2$, epoxide of the type

$-CR_1\text{-}C(R_1)_2$,

$-SO_3M$, $-PO(OR_1)_2$, $-PO(R_1)_3$, $-P(R_1)_3$,-N=C=O and $-CR_1=O$, wherein $R_1$ is equal to H or a group having 1-20 carbon atoms, $R_1$ being the same or different for any $Z_2$ having more than one $R_1$, and wherein M is a metal ion.